GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

[x] ORIGINAL

[ ] REVISION NO. ____

PROJECT ADMINISTRATION DATA SHEET

Project No. A-2964 DATE: 6/8/81

Project Director: George Lee ~~School~~/Lab EDL/IED

Sponsor: Dooly County Commissioners

Type Agreement: Purchase Order No. 1790

Award Period: From 5/8/81 To 8/1/81 (Performance) 8/1/81 (Reports)

Sponsor Amount: $2,526 Contracted through:

Cost Sharing: - GTRI/~~GIT~~

Title: Community Noise Evaluation for Lilly, GA

ADMINISTRATIVE DATA OCA CONTACT Faith G. Costello

1) Sponsor Technical Contact: -SEE BELOW-

2) Sponsor Admin./Contractual Contact: Francis K. Smith, County Clerk, Dooly County, P. O. Box 322, Vienna, GA 31092

Reports: See Deliverable Schedule Security Classification: N/A

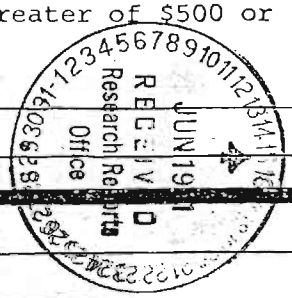
Defense Priority Rating: N/A

RESTRICTIONS

See Attached N/A Supplemental Information Sheet for Additional Requirements

Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with N/A



COMMENTS:

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B-440

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

Date: 7/23/81

Project Title: Community Noise Evaluation for Lilly, Ga.

Project No: A-2964

Project Director: George Lee

Sponsor: Dooly County Commissioners

Effective Termination Date: 8/1/81

Clearance of Accounting Charges: 6/15/81

Grant/Contract Closeout Actions Remaining:

- x Final Invoice and Closing Documents
- _ Final Fiscal Report
- _ Final Report of Inventions
- _ Govt. Property Inventory & Related Certificate
- _ Classified Material Certificate
- _ Other _____

Assigned to: EDL/IED (School/Laboratory)

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Other: _____

A2964-000 FINAL

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION

INDUSTRIAL EXTENSION DIVISION
Central Georgia Area Office
1818 Forsyth Street
Suite 105
P. O. Box 5105
Macon, Georgia 31208
912/744-6190

June 15, 1981

Dooly County Commissioners
c/o Ms. Frances K. Smith,
County Clerk/Treasurer
P. O. Box 322
Vienna, GA 31092

RE: Community Noise Evaluation for Lilly, GA
Contract Number A-2964-000
Dooly County PO No. 1790, Dated May 8, 1981

Dear Sirs:

Attached is the noise evaluation which has been completed for the proposed HUD site in Lilly. If you have questions concerning it, please do not hesitate to contact me.

Sincerelv.

George H. Lee, Director
Central Georgia Area Office

GHL:msz
Attachment
cc: Mr. Don R. ten Bensel
Mayor John Bradley, City of Lilly
Mr. Don Wellington

Project A-2964

COMMUNITY NOISE EVALUATION FOR LILLY, GEORGIA

Prepared for the
Dooly County Commission
Vienna, Georgia

By
George H. Lee
Project Director

Industrial Extension Division
Engineering Experiment Station
GEORGIA INSTITUTE OF TECHNOLOGY
June 15, 1981

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PURPOSE

The purpose of this noise assessment was to accurately measure typical existing day/night (DNL, LDN, or L_{dn}) sound levels at a site which has been proposed for a HUD housing project in Lilly, Georgia.

EQUIPMENT USED

Primary data was taken with the Quest Electronics Model 142-228-12T Equivalent Sound Level Recorder System. Specific equipment used was the Model 228 Integrating Sound Level Meter, Serial No. Z0010002; Model 142 Graphic Level Recorder, Serial No. C001889; and the Model CA-12 Sound Calibrator, Serial No. U0010040. Measurement accuracy of this system is $\pm$1.0 dBA over its temperature range of -10° C to +50° C. Outside temperature was within these limits during the tests and the equipment was satisfactorily calibrated at all times.

This system is specifically intended for the measurement of community noise levels when such noise descriptors as L_{dn} or L_{eq} are required. Samples are made continuously and integrated to yield equivalent levels corresponding to selectable measurement sub-intervals. In this case, in order to achieve reasonable resolution on the noise histogram a four minute sub-interval was chosen. This yielded 360 sub-intervals per twenty-four hour period.

A cross-check of the above measurement system was made with a Bruel & Kjaer Type 2209 Impulse Precision Sound Level Meter, Serial No. 594740; recorded to a B & K Type 2306 Graphic Level Recorder, Serial No. 616003, calibrated with a B & K Type 4220 Pistonphone, Serial No. 577874. Quest fifteen second sub-interval L_{eq} levels of 46.3 and 47.2 dBA were correspondingly calculated from one-fourth (0.25) second samples from the B & K tape output. These yielded 46.2 and 46.7 dBA respectively for excellent correlation of the results.

Data levels for the brief periods of time during which calibration checks were made were estimated, usually with a logarithmic average of ten data levels, five preceding and five following the calibration period.

Calibration checks were made during relatively quiet periods of time. All train-related noise is included in calculations.

The Model 228 was battery powered. The Model 142 was powered from a home approximately 150' away, although battery operation was possible.

Recommended windscreens were in place at all times.

MEASUREMENT LOCATIONS

Equipment was set up at a point which is the Northernmost corner of one of the proposed buildings. The nearest existing building was a small garage approximately 80' away. This point was chosen as being representative of the site since trains blow whistles further North from here and it occupies a relatively unshielded position. Another possible location was considered at the Southern end of the site, approximately the same distance from the tracks, but was rejected since an existing mobile home was rather close to it. The accompanying drawing shows the location used.

MICROPHONE PLACEMENT

A tripod was utilized to fix the microphone 4'-6" above the ground. The microphone's centerline was inclined 45° to 70° to the horizontal as recommended by the manufacturer for the best sensitivity and pointed toward the railroad tracks.

On occasion a 0.5 mil plastic film was placed over the upper microphone and the 228 Sound Level Meter to protect them from scattered rain showers. Such

a film has a minimal effect on accuracy, and then only at higher frequencies.

MEASUREMENT DAY SELECTION

Contact was made with the Macon, Columbus, Cordele, and Atlanta, Georgia, Offices of the Seaboard Coastline Railroad. Freight train traffic through Lilly, or any town, is not really scheduled. Recent traffic totals for two weeks were received from the Atlanta offices and are included in the Appendix.

It was originally determined to measure on Wednesday and Thursday in an attempt to get a resulting average day. Coincident to this study initiation, however, railroad crews began working on the tracks in the area of Lilly during weekdays. Such work, which would affect a long section of this line of track, is scheduled to continue indefinitely at the present time. It was determined, therefore, to measure on weekends in an attempt to get typical traffic. Weekend traffic does not appear to be substantially less than weekday traffic in any regard.

Measurements were ultimately made during the following three twenty-four hour periods:

(1) 7:40 AM June 6, 1981 to 7:40 AM June 7, 1981
(2) 8:44 AM June 7, 1981 to 8:44 AM June 8, 1981
(3) 10:08 AM June 13, 1981 to 10:08 AM June 14, 1981

PERSONNEL

The following individuals assisted in this evaluation: (1) Mayor John Bradley, Mayor, City of Lilly; (2) Don R. ten Bensel, Assistant Executive Director, Middle Flint Area Planning & Development Commission; (3) D. Mobley, Office of the Trainmaster, Seaboard Coastlines, Atlanta, Georgia;

(4) Chip Renfroe, Trainmaster, Seaboard Coastlines, Cordele, Georgia; (5) Edwin L. Lewis, Georgia Tech Industrial Extension Division, Albany, Georgia; (6) Harris T. Johnson, III, Georgia Tech Industrial Extension Division, Carrollton, Georgia; and (7) George H. Lee, Georgia Tech Industrial Extension Division, Macon, Georgia.

RESULTS

The measurements of Day 1 yielded an L_{dn} of 63.9 dBA. This level is, unfortunately, suspect since a new battery lasted only twenty of its forty hour expected life. Data taken during the night of June 6th was, therefore, necessarily questioned since the last calibration was the night before. Data recorded seemed totally comparable, however, to other good data (train passage peaks, etc.) so the L_{dn} was calculated for comparison and is included in this report.

Data from Day 2 yielded an L_{dn} of 64.7 dBA.

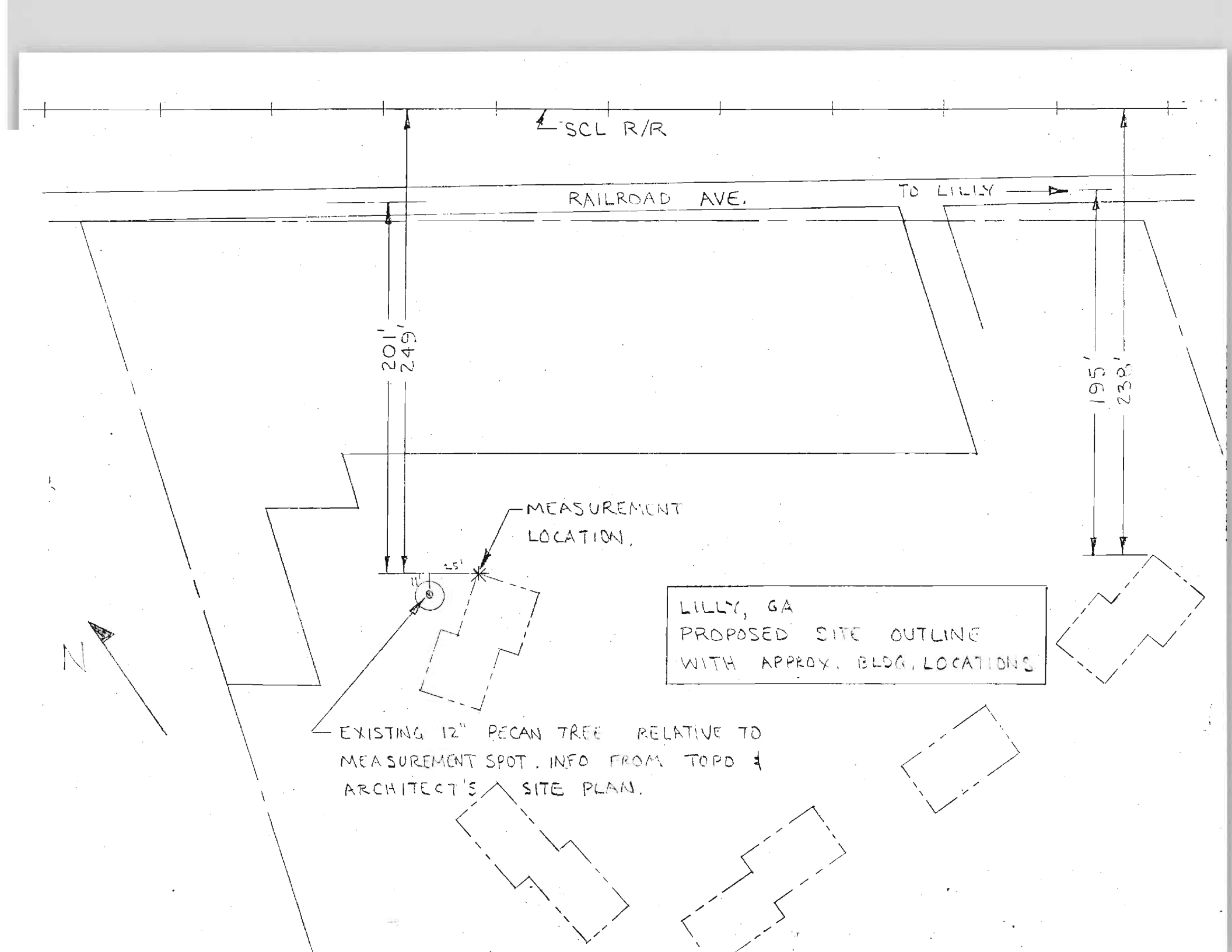
Data from Day 3 yielded an L_{dn} of 66.4 dBA.

COMMENTS

It was not the intent of this study to draw conclusions from the data, but rather to try to measure as accurately as possible the L_{dn} levels found to exist on measurement days which were picked to be as typical as possible of the noise environment at the site under consideration.

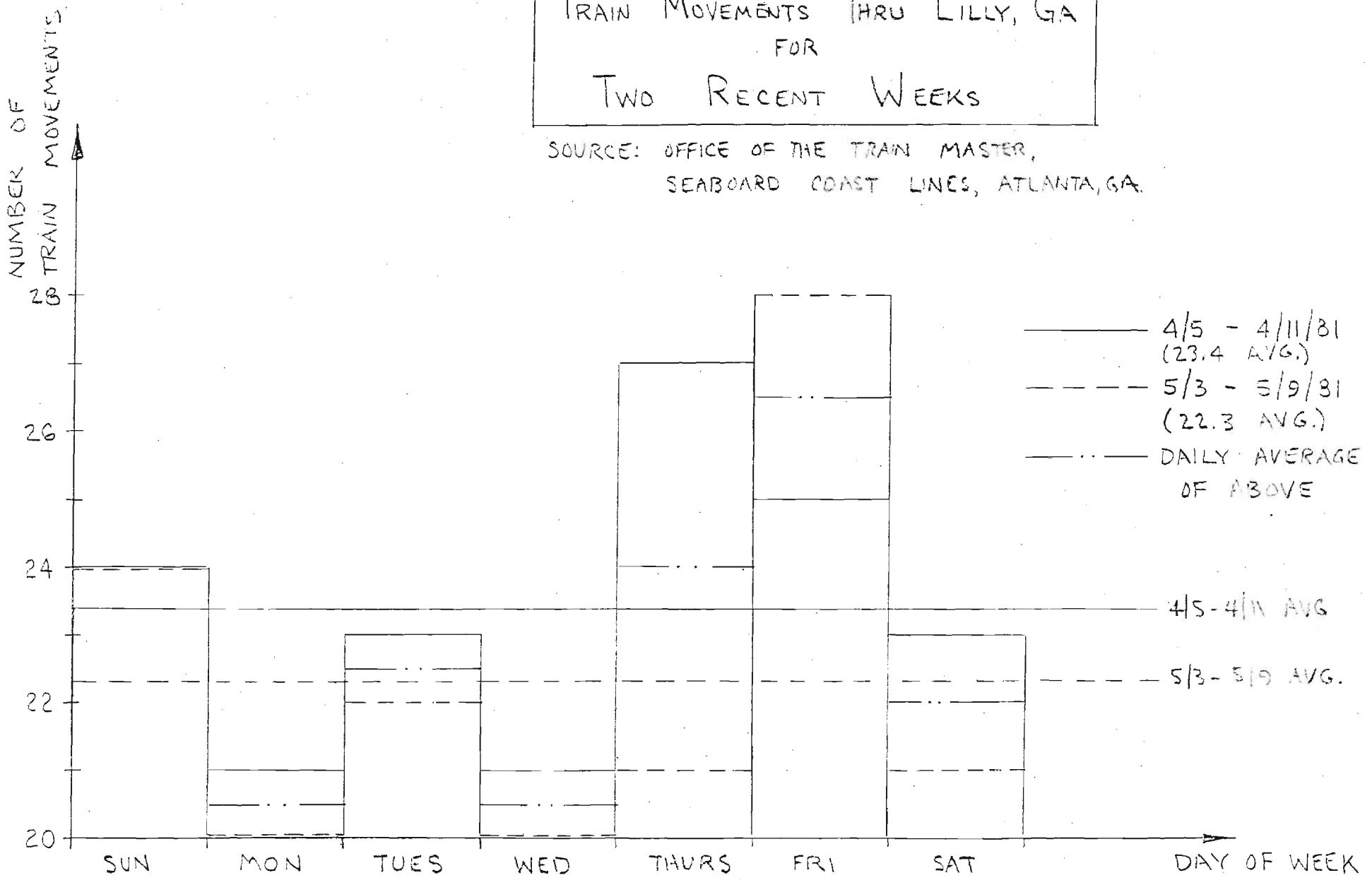
Relative source contributions are considered to be the following, ranked in their order to contribution to calculations made: (1) night trains; (2) day trains; (3) day other; (4) night other. Night trains might contribute on the order of 83%, day trains 11%, day other 3%, night other 3%. These are ROUGH guides to the importance of various contributions by different sources to the total L_{dn} value. "Other" here means people, cars, dogs, etc. Very little automobile traffic affected the site.

APPENDICES


℄ SCL R/R
RAILROAD AVE.
TO LILLY
201'
249'
195'
238'
MEASUREMENT LOCATION.
25'
11"
N
LILLY, GA
PROPOSED SITE OUTLINE
WITH APPROX. BLDG. LOCATIONS
EXISTING 12" PECAN TREE RELATIVE TO MEASUREMENT SPOT. INFO FROM TOPO & ARCHITECT'S SITE PLAN.

TRAIN MOVEMENTS THRU LILLY, GA FOR TWO RECENT WEEKS

SOURCE: OFFICE OF THE TRAIN MASTER, SEABOARD COAST LINES, ATLANTA, GA.



DATA COMPUTATION SUMMARIES

Time	4-minute sub-interval sound level, dBA	Number of Occurrences	Defining Equation Argument (x360)
Day 1			
7:40 AM to 10 PM & 7 AM to 7:40 AM	40.0 - 49.8	79	3,498,191.5
"	50.0 - 59.8	125	38,120,057.4
"	60.0 - 69.8	20	77,416,938.8
"	70.0 - 79.8	1	12,589,254.1
10 PM to 7 AM	40.0 - 49.8	116	32,952,993.9
"	50.0 - 59.8	8	25,394,677.4
"	60.0 - 69.8	10	581,131,737.5
"	70.0 - 79.8	1	104,712,854.8
	TOTALS	360	875,816,705.4
Day 2			
8:44 AM to 10 PM & 7 AM to 8:44 AM	40.0 - 49.8	84	3,098,993.7
"	50.0 - 59.8	102	42,061,730.9
"	60.0 - 69.8	32	103,730,907.3
"	70.0 - 79.8	7	86,202,009.7
10 PM to 7 AM	40.0 - 49.8	122	21,264,308.6
"	50.0 - 59.8	5	16,221,753.0
"	60.0 - 69.8	3	178,986,757.8
"	70.0 - 79.8	5	615,983,085.1
	TOTALS	360	1,067,549,546.1

DATA COMPUTATION SUMMARIES (Continued)

Time	4-minute sub-interval sound level, dBA	Number of Occurences	Defining Equation Argument (x360)
Day 3			
10:08 AM to 10 PM & 7 AM to 10:08 PM	40.0 - 49.8	169	6,956,944.8
"	50.0 - 59.8	41	11,364,375.6
"	60.0 - 69.8	13	58,827,681.8
"	70.0 - 79.8	2	25,771,821.5
10 PM to 7 AM	40.0 - 49.8	112	25,150,644.6
"	50.0 - 59.8	7	32,353,576.3
"	60.0 - 69.8	9	423,291,200.9
"	70.0 - 79.8	7	984,697.665.8
	TOTALS	360	1,568,413,911.3

L_{dn} LEVEL COMPUTATIONS

Day 1

L_{dn} = 10Log (875,816,705.4/360) = 10Log (2,432,824.2) = 10(6.386) = 63.9 dBA

Day 2

L_{dn} = 10Log (1,067,549,546.1/360) = 10Log(2,965,415.4)= 10(6.472) = 64.7 dBA

Day 3

L_{dn} = 10Log (1,568,413,911.3/360) = 10Log(4,356,705.3)= 10(6.639) = 66.4 dBA

Where $L_{dn} = 10\text{Log}\left[\dfrac{\sum_{i=1}^{N} \text{Log}^{-1}(L_{p_i}/10) + \sum_{i=1}^{M} \text{Log}^{-1}((L_{p_i}+10)/10)}{N + M}\right]$

and N = Occurrences from 7 AM to 10PM ("daytime" occurrences)

and M = Occurrences from 10 PM to 7 AM ("night time" occurrences)

SUMMARY OF TRAINS DURING MEASUREMENT DAYS

Day 1
7:40 AM 6/6/81 to 7:40 AM 6/7/81

7:40 AM to 10 PM	12	Trains
10 PM to 7 AM	8	"
7 AM to 7:40 AM	0	"
DAY'S TOTAL	20	Trains

Day 2
8:44 AM 6/7/81 to 8:44 AM 6/8/81

8:44 AM to 10 PM	9	(plus 1 other possibly)
10 PM to 7 AM	7	
7 AM to 8:44 AM	2	
DAY'S TOTAL	18	(plus another possibly)

Day 3
10:08 AM 6/13/81 to 10:08 AM 6/14/81

10:08 AM to 10 PM	10	Trains
10 PM to 7 AM	11	"
7 AM to 10:08 PM	1	"
DAY'S TOTAL	22	Trains

DATA COLLECTED ON TRAINS SEEN DURING MEASUREMENT DAYS

Day 1
7:40 AM 6/6/81 to 7:40 AM 6/7/81

Approx. Time	Approx. Elapsed Time	No. of Engines	Number of Cars	Direction	Speed S-slow M-med. F-fast	Notes
8:17		3	76	North	F	
11:28	1 min	2	60	North	M---F	
11:46		3	85	South	M	
1:45		3	113	South	S to stop	Waited about 15 minutes
2:02	3 min 18 sec	3	99	North	S up to M	
3:56	1 min 34 sec	3	86	South	M	
5:30	40 sec	3	28	North	F	
7:23	1 min	2	41	North	M/F	
7:48		5	113	South	Slowed to stop, wait, move to Med speed, brks squeeked	
8:26	5 min	3	78	North	S--M	
8:55	1 min 15 sec	3	61	South	F	

Day 2
8:44 AM 6/7/81 to 8:44 AM 6/8/81

8:51	1 min 40 sec	3	92	South	M	
11:24	1 min 17 sec	3	85	North	M/F	
12:27	1 min 15 sec	6	89	North	M/F	
12:37	1 min	3	46	North	M/F	
3:25	1 min	4	80	North	F	
5:23	1 min 13 sec	3	66	North	M/F	
9:20	1 min 30 sec	3	73	South	M/F	

DATA COLLECTED ON TRAINS SEEN DURING MEASUREMENT DAYS (Continued)

Day 3
10:08 AM 6/13/81 to 10:08 AM 6/14/81

Approx. Time	Approx. Elapsed Time	No. of Engines	Number of Cars	Direction	Speed S-slow M-med. F-fast	Notes
10:00		3	71	South	M	Not on tape
10:18		3	82	South	M--S	
12:10	1 min 15 sec	2	79	South	M	
2:05	1 min 35 sec	5	103	South	M/F	
3:50	1 min 20 sec	3	101	North	F	
9:07	2 min 30 sec	2	74	South	M--S	
9:30	12 min	3	148	North	Very S	
11:45		3	0	North	F	Not on tape

NOTE: Trains often come in pairs (N/S). One will slow and wait for another to get onto siding at opposite side of town.

DEFINITIONS

A-WEIGHTED SOUND LEVEL: The sound level obtained by use of A-weighting. The unit is the decibel; unit symbol, dB. The unit symbol is followed by the letter A within brackets, dB(A), or it may be used without brackets, dBA, to indicate that A-weighting has been used. In any case the weighting should be specified.

DAY-NIGHT AVERAGE SOUND LEVEL, L_{dn}: The 24-hour equivalent continuous sound level, i.e. the time-averaged A-weighted sound level, in decibels, obtained after the addition of 10 dB to sound levels from 10 PM to 7 AM.

EQUIVALENT CONTINUOUS SOUND LEVEL, L_{eq}: The level of a steady sound which, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.

SOUND PRESSURE LEVEL, L_p: In decibels, 20 times the logarithm (to the base 10) of the ratio of a sound pressure to the reference sound pressure of 20 micropascals.